Apple Computer Technical Repair Info

Apple Service Level I Technical Procedures

apple computer

Apple][Computer and Apple][+ Computer

Sep 1982

35 pages

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APPLE][TECHNICAL PROCEDURES

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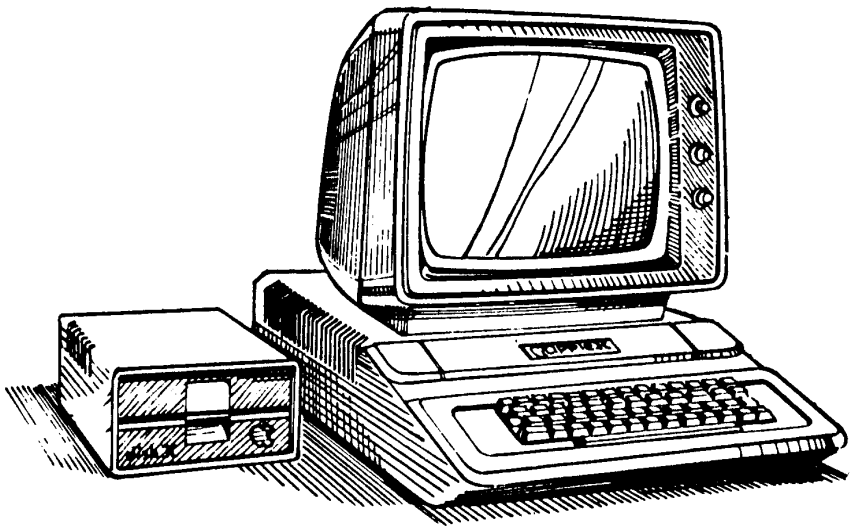

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Apple][Technical Procedures

Section 1

Take-apart

Contents:

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NOTE: These procedures apply to the 150,000 or so pre-EMI Apple][']s. Because of successive revisions of the Apple][design, you may notice slight differences in the configuration of screws and bolts on particular machines you work with. These differences will not significantly alter the procedures.

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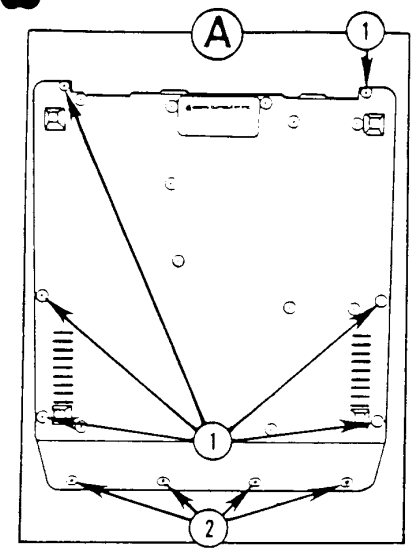

FIGURE A

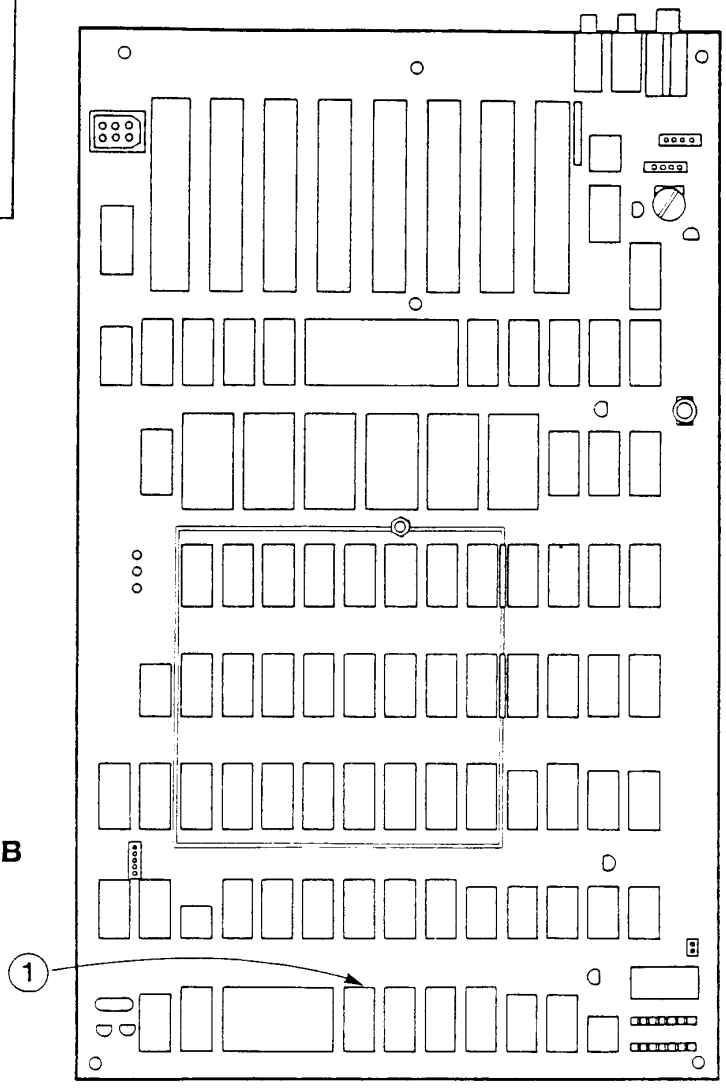

FIGURE B

Apple][Take-apart rev. 9-7-82 page 1.2

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A. OPENING THE CASE

1. Power down; disconnect the power cord and video cable.

2. Remove Apple lid.

3. TOUCH THE POWER SUPPLY TO REMOVE ANY STATIC CHARGE YOU MAY BE CARRYING. Then remove all peripheral cables and cards .

4. Turn the Apple upside down, resting the keyboard on a protective pad.

5. Remove the six flat-head screws from the three outside edges of flat portion of Apple base (see Figure A, #1).

6. Remove the four round-head screws and lock washers from the front of the base (see Figure A, #2).

7. Grasping both base and housing, turn the Apple right side up.

8. Gently lift the front of the housing slightly off the base and unplug the keyboard connector from the front of the motherboard (see Figure B, #1).

   NOTE: If the keyboard connector is difficult to remove, use the IC puller.

9. Lift housing off base and set aside.

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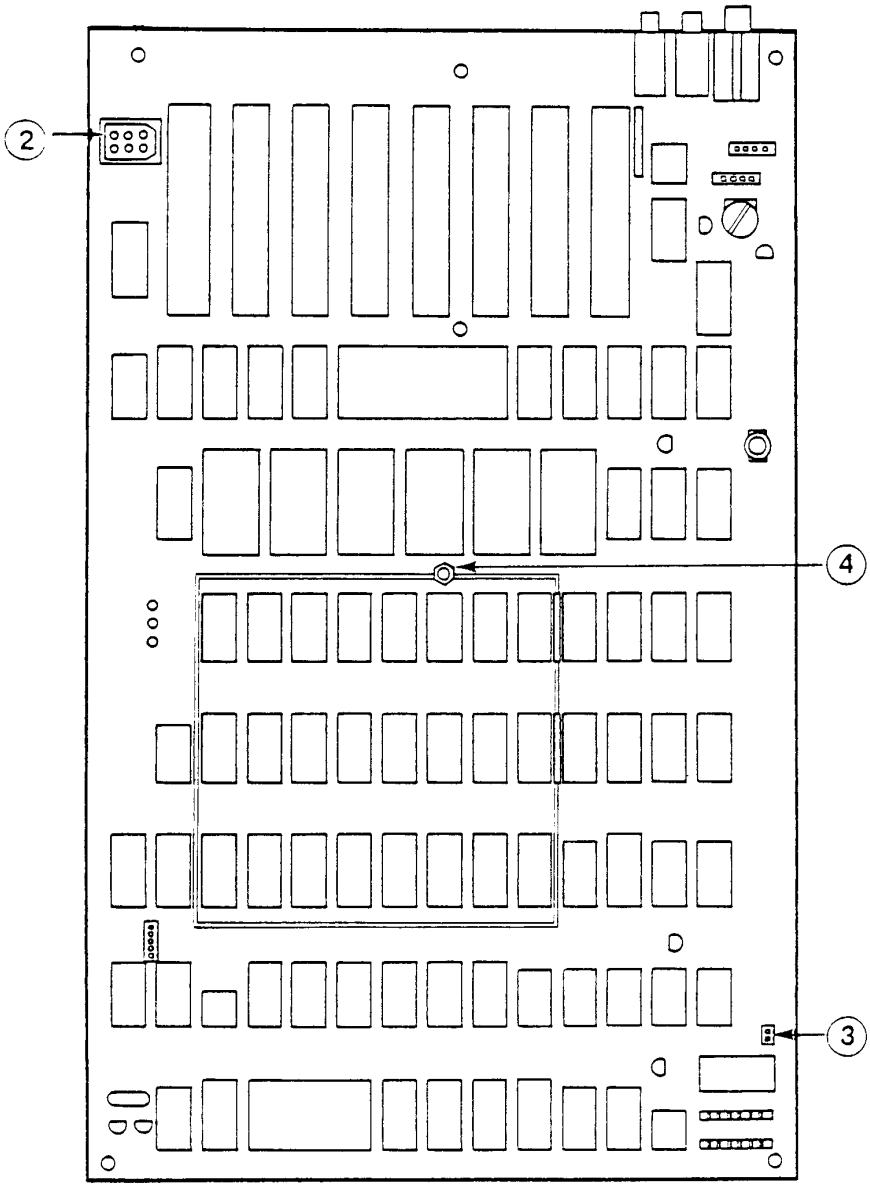

FIGURE B

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B. REMOVING THE MOTHERBOARD

1. Power off. Follow procedures for opening the case (section A above, p.1.3).

2. Pinch the front and rear sides of the power supply plug and pull the plug from the top of the motherboard (see Figure B, #2).

3. Unplug the speaker connector (see Figure B, #3).

4. Using a nutdriver, remove the 5/16" nut and lockwasher in the middle of the motherboard (see Figure B, #4).

5. Using a flatblade screwdriver or needlenose pliers, push in on the flanges of the six stand-offs: one in each corner and two between slots 4 & 5.

6. Carefully lift the board up and out.

REPLACING THE MOTHERBOARD

1. Place the motherboard into position over the four stand-offs at the corners of the board and the two between slots 4 and 5, and press board down into place.

2. Install washer and nut in the middle of the board and tighten just until snug.

3. Plug in speaker connector.

4. Plug in power supply.

5. Place housing over base.

6. Lift the front of the housing slightly and reinstall the keyboard connector. (Be sure pin 1 of the connector plug aligns with pin 1 of the socket.)

7. Grasping both base and housing, turn Apple upside down.

8. Make sure bent tab at back of base fits into slot in housing, then install lock washers and four round-head screws in front of base.

9. Install six flat-head screws in the three outside edges of base.

10. Turn the Apple rightside up.

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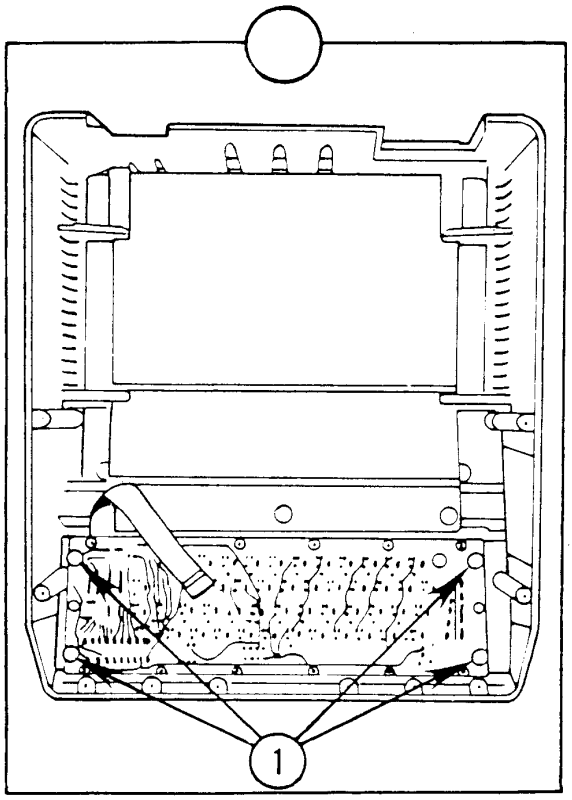

FIGURE C

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C. REMOVING THE KEYBOARD

1. Follow procedures for opening the case (section A, p.1.3).
2. Turn Apple housing upside down so the keyboard rests on protective pad.
3. Remove the four nuts and lock washers (or screws) holding the keyboard to the housing (see Figure C).
4. Lift the keyboard free.

REPLACING THE KEYBOARD

1. Put the keyboard back in place.
2. Replace the nuts and lockwashers (or screws) which hold the keyboard to the Apple housing.
3. Turn the housing rightside up and place it over the base.
4. Lift the front of the housing slightly and plug the keyboard connector into its socket in row A of the motherboard. (Be sure pin 1 of the connector plug aligns with pin 1 of the socket.)
5. Grasping both base and housing, turn Apple upside down.
6. Make sure bent tab at back of base fits into slot in housing, then install lock washers and four round-head screws in front of base.
7. Install six flat-head screws in the three outside edges of base.
8. Turn the Apple rightside up.

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D. REPLACING THE POWER LIGHT

1. Pry off the power light cap.

2. Lift off shift key cap.

3. If the light has a full shield, pry it off. (If it's a half shield, don't try to remove it.)

4. Lift out bulb, using fingers (if they're small enough) or needlenose pliers.

5. Replace bulb, making sure to put both wires into the small sockets.

6. Replace plastic shield.

7. Replace shift key cap and power light cap.

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Section 2

Diagnostics

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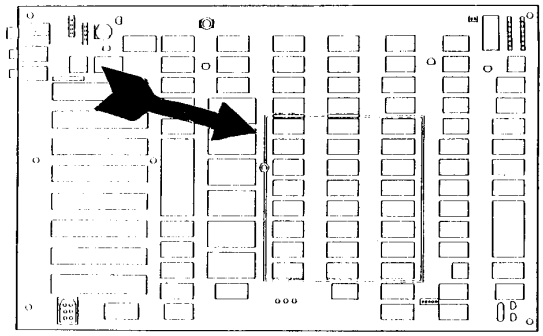
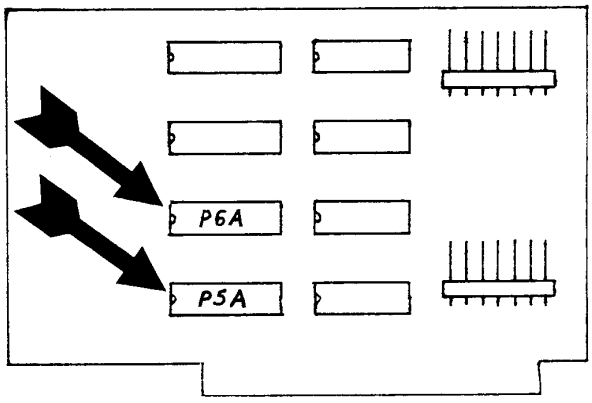
A. GETTING STARTED

The Apple][Product Diagnostics diskette contains a series of tests designed to help you troubleshoot system problems and make adjustments to some commonly used Apple peripherals. The job-aids in this package provide brief descriptions of the function of each test, and guidelines on when and how to use them.

Before you can use the Product Diagnostics, you must have 48K of memory in the system (all of the memory sockets on the motherboard must have memory ICs installed in them).



You must also have the P5A (341-0027) and P6A (341-0028) PROMs installed on the Disk Interface card in slot 6.



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B. TROUBLESHOOTING CHART

This chart is designed to help you decide which test to use for most common problems. Just find the type of complaint that the customer has in the first column, then use the test listed in the second column.

Complaint	Test
Flaky system	Motherboard RAM (p. 4)
Can't use some BASIC programs (motherboard BASIC)	Motherboard ROM (p. 5)
Can't use some BASIC programs (firmware card BASIC)	Applesoft/Integer ROM card (p. 13)
Can't use some programs (language card language)	Language card (p. 14)
Can't use some programs (not language related)	Motherboard RAM (p. 4)
ROM Utilities won't work	Programmer's Aid #1 (p. 6)
Missing characters	Keyboard (p. 7)
Can't select menu items	Keyboard (p. 7)
Paddle/Button problems	Game Paddle/Button (p. 8)
Tape problems	Tape Read/Write/Verify (p. 9)
Display problems	Color Bar (p. 10) Motherboard RAM (p. 4)
Graphics Tablet problems	Graphics Tablet (p. 12)
Disk problems	Disk I/F card (p. 16)
Parallel printer problems	Printer card (p. 18)
Serial Printer problems	Serial/Communications card (p. 20)
Silentype problems	Silentype test (p. 22)
Modem problems	Serial/Communications card (p. 20)

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C. MOTHERBOARD RAM TEST

You would use this test if the customer told you that his system acted "flaky" or wouldn't run certain programs (after you try a known good copy of the suspect program to eliminate the possibility of a software problem). The CONTINUOUS TEST option is useful for finding intermittent problems, and for "burning-in" a system (running it for a while to make sure that it won't fail half an hour after the customer gets it home).

This diagnostic tests each RAM (Random Access Memory) IC on the motherboard. It also checks the RAM at location E2 on the Language Card if that card is installed. During the test, the disk drive is activated to cause electrical noise and put a heavy load on the power supply. These conditions make it more likely that marginal RAMs will fail the test.

To run the test:

1) Boot the Apple][Product Diagnostics diskette.

2) Use the <ESC> key to move the cursor to the MOTHERBOARD RAM TEST line on the main menu, then press <RETURN>.

3) When the title screen appears, you are given a choice of running the test or returning to the main menu (just in case you made a mistake). Press <RETURN> to run the test.

The test will run with no more inputs from you. First you will see a screen full of inverse "@"s, followed by a screen full of normal "?"s. Each of those screens lasts about 30 seconds, and some flickering during the first few seconds of each screen is normal. After these screens, you will see a screen of garbage (you'll know it when you see it), that will change a few times. When the test is over, the results screen will be displayed. This screen is self-explanatory. At the bottom of the screen is a mini-menu that works with the <ESC> and RETURN keys in the same fashion as the main menu.

4) If you want to run the memory test for an extended period, select CONTINOUS TEST and press <RETURN>. The memory test will then cycle until you press <ESC>, which will take you back to the results screen.

If any bad ICs are indicated, replace them and run the test again.

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D. MOTHERBOARD ROM TEST

You would use this test if the customer said that his system had problems running some or all BASIC programs.

This test checks each ROM (Read Only Memory) in the INTEGER or APPLESOFT set on the motherboard, whichever is present.

To run the test:

1) Boot the Apple][Product Diagnostics diskette.

2) Use the <ESC> key to move the cursor to the MOTHERBOARD ROM TEST line on the main menu, then press <RETURN>.

NOTE: This test MUST be observed during operation as it does not "keep records" and report its results as the RAM test does.

The test will run with no more inputs from you. As each ROM is tested the program will display the name of the ROM. After testing, it will report either "NO ERRORS FOUND" (for a good ROM) or "CAN'T MATCH CODE" (for a bad one); then it will go on to the next ROM. When all of the ROMs have been tested, it will return to the main menu.

If one of the ROMs fails, replace it and run the test again.

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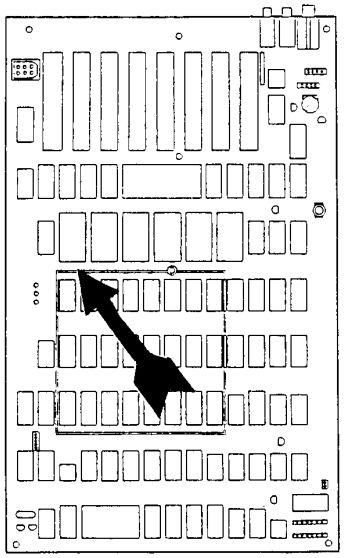
E. PROGRAMMER'S AID #1 TEST

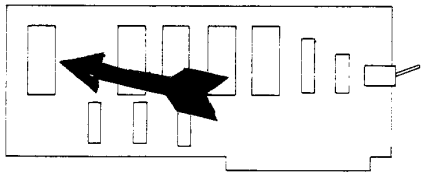
You would use this test if the customer complains that any or all of the functions supported by the Programmer's Aid #1 ROM aren't working correctly. (See the Programmer's Aid #1 manual for a list.)

The test checks the Programmer's Aid #1 utility ROM.

To run the test:

1) Install the Programmer's Aid #1 ROM (341-0016) at the D0 position on the motherboard (location F11) if you have an Apple][, or the INTEGER ROM card (location A1) if you have an Apple][+.





2) Boot the Apple][Product Diagnostics diskette.

3) Use the <ESC> key to move the cursor to the PROGRAMMER'S AID #1 TEST line on the main menu, then press <RETURN>.

NOTE: This test MUST be observed in operation, as it does not "keep records" and report its results as the RAM test does.

The test will run with no further inputs from you. The message "NO ERRORS ENCOUNTERED" will be displayed if the ROM is good, otherwise the message "UNABLE TO MATCH CODE" will appear. The program will then return to the main menu.

If the ROM fails, replace it and run the test again.

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F. KEYBOARD TEST

You would use this test if the customer complains about missing characters when entering data/commands/text or not being able to select functions (like menu items) when using programs.

This test checks (actually, it allows you to check) each key on the keyboard, the keyboard encoder circuits, and the keyboard cable. The test procedure also checks the operation of the shift and control keys in combination with other keys.

To run the test:

1) Boot the Apple][Product Diagnostics diskette.

2) Use the <ESC> key to move the cursor to the KEYBOARD TEST line on the main menu, then press <RETURN>.

After the test is loaded, an introductory screen will be displayed. This screen tells you how to run the test, and explains what you will see on the test screen.

3) Press any key to proceed to the test. When the test screen is displayed, blank out the keyboard "picture" by pressing keys. Make sure that you test both shift keys in the process. To extinguish the inverse characters, hold down the <CTRL> key and press the appropriate letter keys. The <ESC>, <RETURN>, and < ARROW> keys blank out the brackets, backslash, and underscore that represent them on the "picture".

4) After all of the "keys" are blanked out, press the SPACEBAR to return to the menu.

If any single key fails the test, replace the keyboard mechanical assembly (or just the key if you wish). Any other problem indicates a bad keyboard electronic assembly (piggy-backed to the rear of the keyboard mechanical assembly) or the cable, so replace one of them (then the other if the problem remains). After replacing the appropriate module, run the test again.

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G. GAME PADDLE/BUTTON TEST

You would use this test if the customer complains that his paddles aren't working properly.

This test allows you to check the game paddles/buttons, and the circuitry on the motherboard that interfaces with the paddles/buttons.

To run the test:

1) Connect the Game Paddles to the GAME I/O socket near the right rear corner of the motherboard (to the right of the front end of the last peripheral slot).

2) Boot the Apple][Product Diagnostics diskette.

3) Use the <ESC> key to move the cursor to the GAME PADDLE/BUTTON TEST line on the main menu, then press <RETURN>.

After the test is loaded, an introductory screen will be displayed. This screen explains how to use the test screen.

4) Press any key to get to the test screen. Markers on the bottom and right edges of the white square show the actual values being read from the paddles.

5) Slowly rotate each paddle control through its entire range. The asterisk should move around the white area. The markers should keep pace, indicating values from 0 to 255. The sweep of values should cover the full range of rotation of the control (i.e. they shouldn't read 0 or 255 when the control isn't near one of it's limits).

6) Push each paddle button. The white area should turn black and the asterisk should turn white. The "colors" will swap repeatedly if the button is held in.

7) Press <ESC> to return to the main menu when you have finished.

If any part of the test fails, replace the paddles and run the test again. If it still fails, replace the motherboard and run the test again. Alternatively you could test the paddles on a system with a known good motherboard. If the test fails there, the paddles are bad; if it passes, the motherboard in the customer's system is bad.

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H. TAPE READ/WRITE/VERIFY TEST

You would use this test when the customer complains that he can't save data or programs on tape or can't read them from tape.

This test checks the tape recorder itself, the audio cables, and the circuitry on the motherboard that writes to and reads from a tape recorder. It can also be used to "calibrate" a tape recorder to work with the system.

To run this test:

1) Connect a cable between the CASSETTE OUT jack on the rear of the Apple][and the input (MIC) jack on the recorder (this is for the write phase). Connect another cable from the output (MON) jack on the recorder to the CASSETTE IN jack on the Apple][(this is for the read phase).

2) Put a scratch (expendable) tape in the recorder and rewind it. Set the record and playback levels to mid-range.

3) Boot the Apple][Product Diagnostics diskette.

4) Use the <ESC> key to move the cursor to the TAPE READ/WRITE/VERIFY TEST line on the main menu, then press <RETURN>.

Instructions will be displayed for each phase of the test. Simply follow them as they appear. The write phase and read phase will each take about 10 seconds.The message "TAPE READ/WRITE TEST OK" will appear after the test is finished.

If errors are found, you will be told to readjust the recorder and try again.

If the test locks up (doesn't do anything new after a long time), it means that nothing is being read from the tape. Make sure that the recorder is working (you can test it with a microphone and your voice). The cables must also be good to carry the signal both ways. Check them for continuity and shorts, or try a different set. The volume level must also be correctly set - that is a trial and error process (the technical specification is 1V peak-to-peak at the CASSETTE INput jack).

If the recorder is working and set up properly (maybe it works with another system?) and the cables are good, replace the motherboard and run the test again.

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I. COLOR BAR TEST

You would use this test if the customer complained about display problems.

This test allows you to check the display device (monitor or TV), the video cable, and the video generating circuitry on the motherboard.

To run the test:

1) Boot the Apple][Product Diagnostics diskette.

2) Use the <ESC> key to move the cursor to the COLOR BAR TEST line on the main menu, then press <RETURN>.

An introductory screen will be displayed, giving instructions on how to use the test screen. You are also given a choice of returning to the main menu or proceeding with the test.

3) Press <RETURN> to proceed with the test.

CONTINUED ON REVERSE

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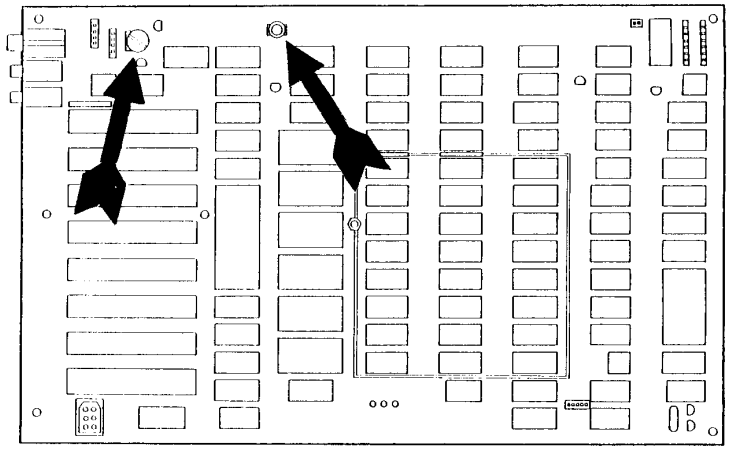
The test screen that is displayed consists of a set of color bars in a frame. The numbers along the bottom of the frame are the color codes. The colors are:

0=black	1=magenta	2=dark blue	3=purple
4=dark green	5=grey	6=med blue	7=light blue
8=brown	9=orange	10=grey	11=pink
12=green	13=yellow	14=aqua	15=white

NOTE: Don't try to adjust the color trimmer capacitor on a black and white display; you won't see any changes.



4) When you are finished, press <ESC> to return to the main menu.

If the picture cannot be made acceptable, try a different monitor and/or cable and run the test again. If the problem persists, replace the motherboard and run the test again.

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J. GRAPHICS TABLET TEST

You would use this test if the customer complained about problems with a graphics tablet.

This test allows you to check the operation of the Graphics Tablet, Graphics Tablet Pen, and Graphics Tablet Interface Card.

To run the test:

1) Install the Graphics Tablet Interface card in slot 4 and connect the tablet and pen to it.

2) Boot the Apple][Product Diagnostics diskette.

3) Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.

4) Use the <ESC> key to move the cursor to the GRAPHICS TABLET TEST line on the card tests menu, then press <RETURN>.

5) The first screen lists some things that must be done before the test will run. If any of the conditions have not been met, do whatever is necessary to meet them and start again. Otherwise, press <ESC> to continue.

The test will check the ROM on the interface card and report whether it is good or bad, give you instructions on adjusting the interface card, display a set-up screen for doing the adjustment, give instructions for testing the tablet, display a screen for that test, and tell you if the tablet works.

If the ROM test fails, replace the ROM and run the test again. If you can't get the correct display during the interface card adjustment, replace the pen and run the test again. If the attempted repair doesn't fix the problem, replace the interface card. If you get missing dots during the surface test, replace the tablet.

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K. APPLESOFT/INTEGER ROM CARD TEST

You would use this test if the customer complained about problems in running programs written in the type of BASIC contained on the firmware card.

This test checks each ROM in the APPLESOFT or INTEGER set on a firmware card, whichever is installed.

To run the test:

1) Install the firmware card in slot 0.

2) Boot the Apple][Product Diagnostics diskette.

3) Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.

4) Use the <ESC> key to move the cursor to the APPLESOFT/INTEGER ROM CARD line on the card test menu, then press <RETURN>.

NOTE: This test MUST be observed during operation as it does not "keep records" and report its results as the RAM test does.

The test will run with no more inputs from you. As each ROM is tested the program will display the name of the ROM. After testing the ROM it will report either "NO ERRORS FOUND" (for a good ROM) or "CAN'T MATCH CODE" (for a bad one), then it will go on to the next ROM. When all of the ROMs have been tested, it will return to the card test menu.

If any of the ROMs fail, replace it and run the test again.

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L. LANGUAGE CARD TEST

You would use this test if the customer complained about problems loading or running programs that use the language card (e.g. Pascal, Pilot, Logo, Fortran, Cobol, etc.).

This test checks the RAM and the Autostart ROM located on the language card. The disk drive is activated during the test to create electrical noise and to put a heavy load on the power supply. These conditions make it more likely that marginal RAM will fail.

To run the test:

1) Install the Language card in slot 0. The cable replaces the RAM IC at location E3 on the motherboard (the left rear corner of the outlined memory area).

2) Boot the Apple][Product Diagnostics diskette.

3) Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.

4) Use the <ESC> key to move the cursor to the LANGUAGE CARD line on the card test menu, then press <RETURN>.

The test will check the language card RAM and display the results. The results screen has a mini-menu at the bottom that works with the <ESC> and RETURN keys as the other menus do. RETEST and BEGIN CONTINUOUS TEST refer to the RAM test only, not to the entire language card test.

5) Select PROCEED WITH TEST and press <RETURN>.

The test will display two status pages, then test the Autostart ROM. You'll have to press a key to proceed from each of those steps to the next. For the ROM test, the message "NO ERRORS ENCOUNTERED" (for a good ROM) or "CANNOT MATCH CODE" (for a bad ROM) will be displayed briefly (so you must be watching) before the test returns to the card test menu

If any RAM is shown as bad on the results screen, replace the bad IC and run the test again. If any status states are bad, replace the language card and run the test again. If the ROM fails, replace the ROM and run the test again.

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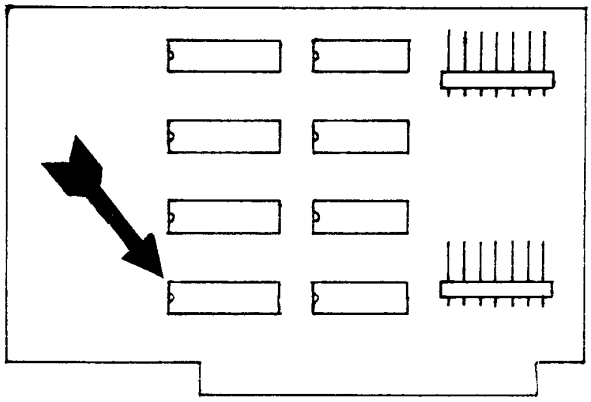
M. DISK I/F CARD TEST

You would run this test if the customer complained about problems in saving programs or data to a diskette, or loading them from a diskette.

This test checks the P5 or P5A PROM installed at location D3 on the disk interface card, whichever is installed.

To run the test:

1) Note whether the Disk Interface card has a P5 (341-0027) or a P5A (341-0028) PROM installed at location D3.



2) Install the Disk Interface card in slot 6.

NOTE: If you are unable to boot using the Interface card being tested (because it has a P5 PROM or won't work), install it in a slot other than 0 or 6, and boot with a known good interface card in slot 6.

3) Boot the Apple][Product Diagnostics diskette.

4) Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.

5) Use the <ESC> key to move the cursor to the DISK I/F CARD line on the card test menu, then press <RETURN>.

CONTINUED ON REVERSE

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6) When prompted to do so, enter the slot number where the Disk Interface Card is installed.

7) When asked if the language card PROM is installed, answer Y if there is a P5A PROM or N if there is a P5 PROM on the card.

NOTE: This test MUST be observed while running, as it doesn't "keep records" or maintain a results display like the RAM test.

The test will finish with no more inputs from you. If the PROM checks out OK, it will tell you so. If not, the message "UNABLE TO MATCH CODE" will be displayed. After reporting its results, it returns to the card test menu.

If the PROM fails, replace it and run the test again. If the problem persists, replace the interface card and run the test again.

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N. PRINTER CARD TEST

You would use this test if the customer complained about problems in the operation of a parallel printer (i.e. Epson or Centronics).

This test checks the PROM on the APPLE Parallel Interface card.

To run the test:

1) Install the Parallel Interface card in slot 1.

2) Boot the Apple][Product Diagnostics diskette.

3) Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.

4) Use the <ESC> key to move the cursor to the PRINTER CARD line on the card test menu, then press <RETURN>.

5) When prompted to do so, enter the slot number where the Parallel Interface card is installed (slot 1).

NOTE: This test MUST be observed during operation, as it doesn't "keep records" and it returns to the menu when it is done.

The test will run with no further inputs from you. When it is done, it will report "CODE CHECKS OUT OK" for a good PROM or UNABLE TO MATCH CODE" for a bad one.

If the PROM fails the test, replace it and run the test again. If the problem persists, replace the interface card.

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0. SERIAL/COMMUNICATIONS CARD TEST

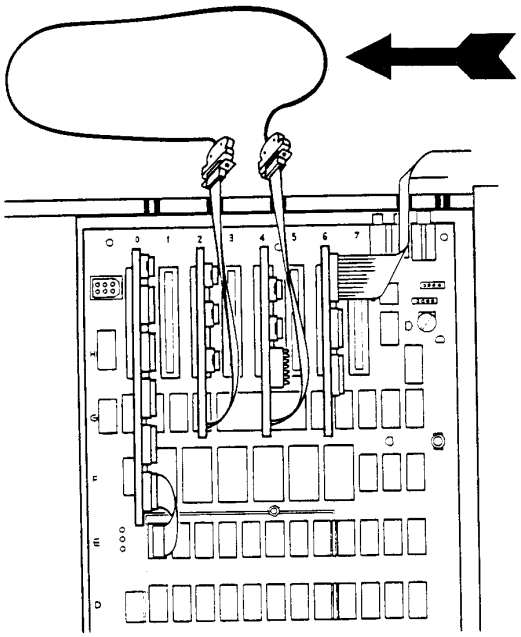
You would use this test if the customer complained about problems in the operation of a serial printer (e.g. Qume or Diablo) or modem.

This test checks the Apple Serial Interface card and the Apple Communications Interface card. Both cards must be installed for the test to operate.

To run the test:

1) Install the Serial interface card in slot 1, and the Communications interface card in slot 2.

2) Connect a loop-back jumper cable between the Serial Interface and Communications Interface connectors.



3) Boot the Apple][Product Diagnostics diskette.

4) Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.

5) Use the <ESC> key to move the cursor to the SERIAL/COMMUNICATION CARD line on the card test menu, then press <RETURN>.

CONTINUED ON REVERSE

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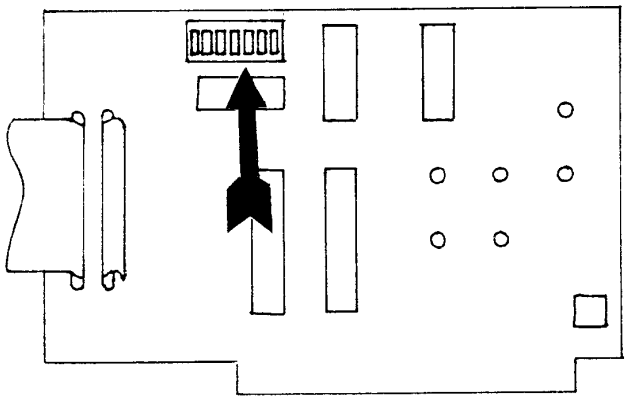
6) When prompted to do so, enter the slot numbers for the Serial Interface card (slot 1) and the Communications Interface card (slot 2). The test will check the PROMs on both cards, reporting their status (CODE CHECKS OUT OK or UNABLE TO MATCH CODE).

7) When the switch test screen appears, make sure that the picture matches the actual DIP switch positions on the Serial card. Then manipulate each switch to both of its positions and watch to see that the picture follows the switch. Finish up with all of the switches ON except switch #2.



8) Press <ESC>. When the communications test screen appears, slowly type a few characters. The characters that you type should appear on both the SENT and RECEIVED lines.

9) When you are satisfied that the communication from Serial card to Communications card is good (about 8 characters), press <ESC> ONCE. This will reverse the direction of the test. The screen will look almost identical except for the labels on the SENT and RECEIVED lines.

10) Slowly type a few more characters. They should appear on the SENT and RECEIVED lines as you type them.

11) When you are satisfied that the Communications card is talking to the Serial card properly, press <ESC>.

The test will display a status screen, telling you what revision PROMs are on each card and whether the cards are working properly.

If any of the PROMs fails the test, replace it. If the problem persists, replace the appropriate card. If the switch setting test doesn't work, replace the Serial card. If the communication test fails, replace the Serial card. If it still fails, replace the Communications card. After any of these actions, run the test again.

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P. SILENTYPE TEST

You would use this test if the customer complained about poor print quality or any problems in the operation of the Silentype.

This test checks the PROM and RAM on the Silentype Interface card and the various functions of the printer mechanism. You have the option at the beginning of the test of printing a printer alignment pattern instead of running the test.

To run the test:

1) Install the Silentype Interface card in slot 1 and connect the Silentype to it.

2) Boot the Apple][Product Diagnostics diskette.

3) Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.

4) Use the <ESC> key to move the cursor to the SILENTYPE TEST line on the card test menu, then press <RETURN>.

5) When given the option of aligning the print head, reply "N" (unless you are doing an alignment, which is beyond the scope of this lesson).

The test will check the PROM (firmware) and RAM on the Silentype Interface card and report the status of each. It will then check the margin switch on the Silentype and report its status.

6) The test will now exercise the carriage and paper drives, printing and variable intensity circuits, and bi-directional print function. It takes a few seconds after the screens appear before the tests actually start. Judge the printer's performance in each step according to the standards given by the diagnostic. Enter "Y" if it is acceptable or "N" if it isn't. If all of the tests pass, the test will return to the card test menu.

It would be redundant to list here what you should do if a part of the Silentype test fails, because a list of recommended corrective actions is provided by the test itself in the event of failure (including if you tell it that the result of one of the print function tests was unacceptable).

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Apple][Technical Procedures

Section 3

Troubleshooting

Contents:

Apple][Troubleshooting Chart.....3.3
Apple][Chip Swapping Chart.....3.5

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Apple][Troubleshooting Chart

NOTE: The Probable Causes are listed in the order of probable failure. It is recommended that Probable Causes are checked or replaced in the order listed.

Symptom	Probable Cause
Apple will not boot; drive comes on.	1) RAM row E. 2) RAM on Language Card at location E2. 3) Motherboard
Programs run erratically, often crash.	1) RAM 2) Motherboard
No beep and no message is displayed; monitor has random characters on screen when the Apple is turned on; drive does not come on.	1) RAM row C. 2) "F8" ROM at location F3 on the motherboard. 3) "F8" ROM on the Language Card at location E2. 4) Motherboard
Peripheral does not work properly.	1) Motherboard
Keys fail to remove appropriate character from the keyboard test on the Apple][diagnostic.	1) Keyboard Cable 2) Keyboard Electronic 3) Keyboard Mechanical 4) Motherboard
Applesoft or Integer BASIC fails to operate or is erratic.	1) ROM 2) Motherboard
Game I/O port malfunction (Check with diagnostic.)	1) Game Paddles 2) Motherboard
All video malfunctions (Graphics and Text)	1) Motherboard
Cassette Interface malfunction	1) Motherboard

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Apple][Troubleshooting Chart

Symptom	Probable Cause
Apple][system dead. (No beep, no video, no power light)	1) Power Supply 2) Motherboard
Apple][system dead (No beep, no video, power light on).	1) Power Supply 2) Motherboard
Speaker malfunction	1) Speaker 2) Motherboard
No video display	1) Video Cable 2) Video pot adjustment 3) Motherboard

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Apple][Chip Swapping Chart

Symptom	Location(s)	Defective Chip Type
Dead Apple System (Power On Light)	A2	74LS00
	B1	74S174
	B2	74S86
	B13	74LS02
	C1	74LS153
	C2	74LS195
No RESET or No Response	A13	555
	B5	74LS174
	B6	74LS257
	B7	74LS257
	B8	74LS174
	B11	74LS08
	C14	74LS32
	E11,12,13	74LS153
	F12	74LS138
	F13	74LS138
	F14	9334
	H1	74LS08
	H3,4,5	8T97
	H8	6502
	H10,11	8T28
	H14	74LS5251
Apparent ROM Problems	F12	74LS13
	H1	74LS08
Apparent RAM Problems	A2	74LS00
	B5,8	74LS174
	C14	74LS32
	D2	74LS20
	E2	74LS139
	E11,12,13	74LS153
	F2	74LS139
	H1	74LS08
No Video (Speaker does Beep)	A2	74LS00
	A8	74LS257
	A9	74LS151
	A10	74LS194
	B2	74S86
	B10	74LS74
	B13	74LS02
	C2	74LS195
	C11	74LS04
	D11,12,13,14	74LS161

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Apple][Chip Swapping Chart

Symptom	Location(s)	Defective Chip Type
No Text Mode	A3	74166
	A5	1513
	A8	74LS257
	A9	74LS151
	A10	74LS194
	B2	74S86
HIRES or LORES Problem	A0	74LS194
	A8	74LS257
	A9	74LS151
	A11	74LS74
	B4,9	74LS194
	B10	74LS74
	C11	74LS04
	C12	74LS257
	F14	9334
	H1	74LS08
	J1	74LS257
Dark Screen	A2	74LS00
	B1	74LS174
	B2	74S86
	C1	74LS153
	C2	74LS195
V or H SYNC Fails	C13	74LS51
	C14	74LS32
	D11,12,13,14	74LS161
Wrong Page or Video Mode	B5,8	74LS174
	B11	74LS08
	B12	74LS11
	B13	74LS02
	C11	74LS04
	C12	74LS257
	E11,12,13	74LS153
	E14	74LS283
	F2	74LS139
	F14	9334
	H1	74LS08
	J1	74LS257

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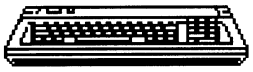
Apple][Chip Swapping Chart

Symptom	Location(s)	Defective Chip Type
Wrong or Bad CHRS	A3	74166
	A5	1513
	B5,8	74LS174
	B6,7	74LS257
Bad Cursor	A3	74166
	B2	74S86
	B11	74LS08
	B13	74LS02
Bad Graphics	A8	74LS257
	A9	74LS151
	A10	74LS194
	A11	74LS74
	B4,9	74LS194
No Color	B12	74LS11
	B13	74LS02
	C13	74LS51
Game Paddles Problem	F13	74LS138
	H13	558
	H14	74LS251
Cassette Loading Problem	F13	74LS138
	H14	74LS251
	K12	741 OP AMP
Cassette Saving Problem	F13	74LS138
	K13	74LS74
Speaker Problem	F13	74LS138
	K13	74LS74
Keyboard Problem	A12	74LS02
	B6,7	74LS257
	B10	74LS74
	C11	74LS04
	F13	74LS138
Peripheral Card in Slot Won't Work	H2,12	74LS138

FINIS

Apple][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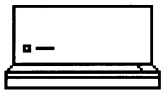
(late model)

Apple //c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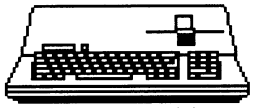
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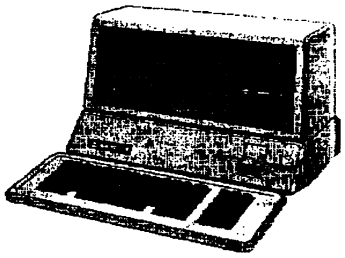
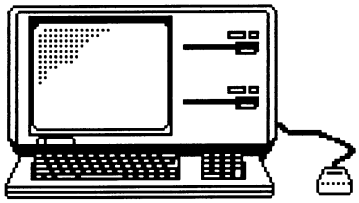
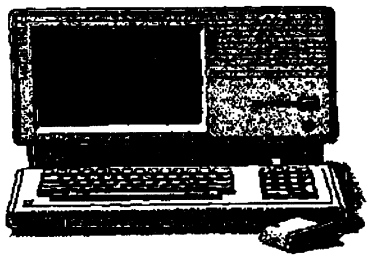
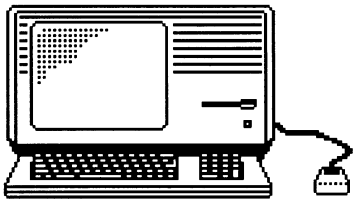



Lisa

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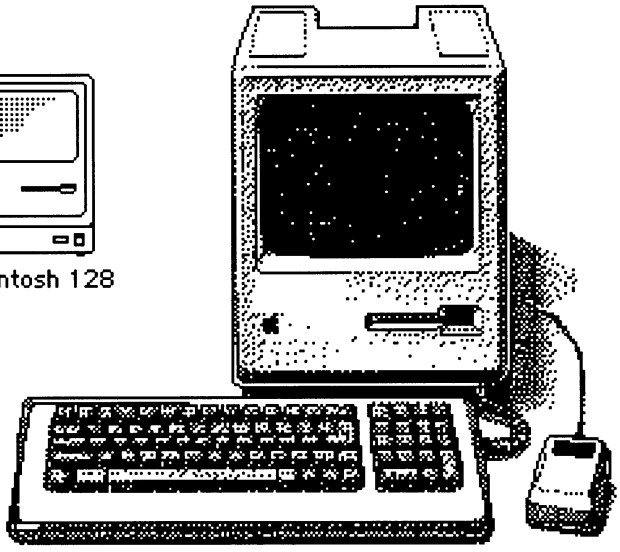
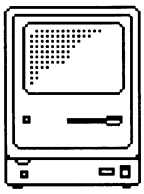
End of Apple Service Repair Information

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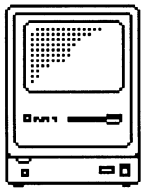
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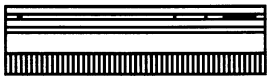
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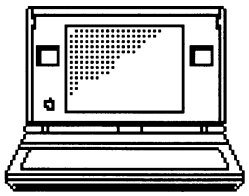
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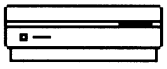
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